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MARKET DISEASES OF STRAWBERRIES FROM THE SOUTHEASTERN STATES, 1926 TO 1930

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MATERIAL STUDIED

The strawberry is commercially the most important of the small fruits. It is also the most widely cultivated, being grown to some extent in every State in the Union. The long-distance movements of strawberries originate to a large extent in the Southeastern States. Losses from decay in transit have been large, and their cause and control have been the subject of much study. The following analysis was made as a means of checking the extent of losses during the five years 1926 to 1930, inclusive.

The material used as a basis for this circular was obtained from the reports of the food-products inspection service of the Bureau of Agricultural Economics. These reports were used because they are based solely on market inspections by unprejudiced observers and therefore furnish a type of information not obtainable from the usual sources of plant-disease reports or crop-loss estimates.

The present circular summarizes the diseases reported from 1926 to 1930, inclusive, and supplements the earlier work of Rose,[1] covering the period 1919 to 1925.

TABULATION AND ANALYSIS OF DATA

The reports summarized here, and in general those summarized in the earlier circular, give information regarding the condition of strawberries from the Southeastern States. Of the States with over 100 inspections in either period, 3, Alabama, Florida, and Louisiana, are in the group usually classed as early; 4, Arkansas, North Carolina, Tennessee, and Virginia, are in the group classed as second early; and 4, Delaware, Kentucky, Maryland, and Missouri, are in the intermediate group. Such important northern strawberry-growing States as Michigan, New York, and Ohio, as well as the Pacific States, all of which grow large quantities of strawberries, are represented by relatively few reports.

[1] Rose, D. H. DISEASES OF STRAWBERRIES ON THE MARKET. U. S. Dept. Agr. Circ. 402, 8 p., illus. 1926.

The number of inspections requested on car lots coming from any State, or during any given season, naturally varies with market and other conditions. In those regions where buyers regularly purchase the berries outright at the shipping points relatively few inspections are requested. Thus North Carolina, an important strawberry-producing State, is inadequately represented in the reports.

From the 11 States listed in Table 1 the total number of car lots of strawberries inspected on the market from 1926 to 1930 was 9,543 as compared with 4,858 for the previous seven years. That is, results contained in this circular are based on inspection of almost twice as many cars as those from the same States during the earlier period. Considered on the basis of percentage of total cars shipped from these States during the two periods, the inspected cars represented about 6 per cent of all those shipped from these States during 1919 to 1925 and slightly over 13 per cent during 1926 to 1930.

TABLE 1.—*Comparison of total car lots of strawberries inspected and number showing no rot, for the periods 1919–1925 and 1926–1930*

State of origin	1919–1925		1926–1930	
	Total car lots	Car lots showing no rot	Total car lots	Car lots showing no rot
Alabama	104	4	169	49
Arkansas	574	178	1,632	661
Delaware	189	66	274	114
Florida			543	226
Kentucky	207	61	380	138
Louisiana	1,628	483	3,574	1,483
Maryland	406	147	830	398
Missouri	402	236	1,191	570
North Carolina	184	73	55	3
Tennessee	845	171	583	164
Virginia	319	148	312	134

In the period 1919 to 1925 slightly over 32 per cent of the car lots inspected showed no rot, while in 1926 to 1930 the number showing no rot was slightly above 41 per cent. To eliminate this source of error in comparisons, all averages and percentages in this circular have been based on the number of car lots showing decay.

Computed even on this basis, in each State on which a report was made on 100 cars or more during either period, they show (Table 2) a reduction in the average decay reported since 1925 as compared with that reported before that time. The averages for these nine States range from 15 to 3.8 per cent for the period 1919 to 1925 and from 9 to 2.5 for the period 1926 to 1930.

TABLE 2.—*Comparison of average percentage of rot in inspected car lots of strawberries showing rot, for the periods 1919–1925 and 1926–1930*

State of origin	1919–1925		1926–1930	
	Car lots showing rot	Average amount of rot	Car lots showing rot	Average amount of rot
	Number	*Per cent*	*Number*	*Per cent*
Alabama	100	15.0	120	9.0
Arkansas	396	10.4	971	4.5
Delaware	123	8.9	160	2.6
Kentucky	146	10.5	242	3.0
Louisiana	1,145	5.3	2,091	3.2
Maryland	259	4.2	432	2.5
Missouri	166	8.0	621	5.1
Tennessee	674	12.0	319	8.6
Virginia	171	3.8	178	2.6

The rots of strawberries which are recognizable on the market are of two fairly distinct kinds—leak, caused by *Rhizopus nigricans*, which enters chiefly if not solely through wounds after the berry is picked, and the brown rots. The members of this latter group are alike in that the infection usually occurs in the field and the rot may develop either in the field or in transit.

Table 3 gives the average percentage of decay from Rhizopus rot and all other rots by years for all States which reported inspection of over 50 cars. Only in the case of Missouri in 1926 and Virginia in 1930 does the total rot for any year equal the average for the seven years ended in 1925. Among the factors which may account for this difference, improved handling methods and improved refrigeration seem to be the most probable. There have been few changes in varieties or in cultural methods, but much educational work has been done which has tended to improve handling methods, and there have been mechanical improvements in refrigeration and equipment. Perhaps the greatest improvement is the general shortening of the time between field and car by improved roads and the general use of trucks for transportation. Additional strength is lent to this idea by the fact that the decline is greatest in Rhizopus rot, which is influenced more than any of the others by handling and refrigeration. With the single exception of Delaware for 1930, the reported losses from Rhizopus rot are less in each State every year, 1926 to 1930, inclusive, than the average for that State for the period 1919 to 1925.

TABLE 3.—*Percentages of Rhizopus and other rots in car lots of strawberries by years, 1926 to 1930, compared with the period 1919–1925* [1]

[Computed on basis of carloads showing rot]

State of origin	1919–1925		1926		1927		1928		1929		1930	
	Rhizopus rot	All other rots	Rhizopus rot	All other rots	Rhizopus rot	All other rots	Rhizopus rot	All other rots	Rhizopus rot	All other rots	Rhizopus rot	All other rots
Alabama	10.3	4.6							2.7	4.4	2.0	0.8
Arkansas	3.8	6.7	0.8	0.6	1.6	3.2	1.5	2.2	1.5	3.9	1.3	1.6
Delaware	3.8	5.1	.4	1.5	.5	2.0	.7	1.6	.6	3.3	4.4	1.6
Florida	10.2	3.2	4.3	2.0	5.6	1.6					10.7	2.6
Kentucky	6.4	4.1	2.0	5.1	1.5	1.4	.9	1.6	.5	2.8		
Louisiana	3.6	1.7	.9	2.3	2.2	1.8	1.4	.9	2.4	1.7	.9	1.5
Maryland	2.1	2.1	.1	1.1	.3	1.8	1.3	2.0	.5	2.3	1	2.2
Missouri	5.8	2.2	3.9	9.4	2.7	1.7	1.8	1.7	3.1	2.2	1	2.0
North Carolina	1.8	2.3										
Tennessee	6.6	5.5	3.1	1.1	3.9	5.6	3.5	1.4	1.1	5.0	1.6	1.2
Virginia	2.1	1.7	.3	1.8	.5	1.4	.3	1.1	.7	1.9	1.3	2.8
Simple average [2]	4.63	3.6	1.4	2.9	1.7	2.4	1.4	1.6	1.5	3.1	1.7	1.7

[1] All figures based on less than 50 cars per year per State have been omitted except Maryland, Delaware, and Virginia, the chief strawberry-growing sections of which constitute a single geographic and cultural area and serve as a check on each other.

[2] The figures for Florida have been omitted from these averages. (See explanation on p. 4.)

Not only is the loss on strawberries from Rhizopus rot during 1926 to 1930 less than that caused by this rot in the period 1919 to 1925, but also it is less than the loss due to the other rots. The reduction of Rhizopus rot during this period was so great that while it may still be the most important single cause of decay of southern strawberries in transit and on the market, it is no longer more important than all other rot fungi put together. Indeed, as the averages show, only in 1930 did it equal in importance the other causes of strawberry rots.

It is, of course, very important in Florida, perhaps because the special methods of picking employed there seem to favor this development.

The figures for Florida are included in Table 3 for the information they contain, even though they are not comparable with those of the other States. As explained in Circular 402,[2] Rose computed the figures for Florida on the basis of inspection reports, some of which were for car lots and some for "pony" refrigerators. The figures for 1926, 1927, and 1930 are based on inspections of car lots only, but even these are not comparable among themselves, since the inauguration of express-car service in 1930 greatly increased the number of inspections of car lots from this State.

The figures available in the reports of the food-products inspectors can not be considered as showing anywhere near the entire loss from rot, even in sections well represented in the inspectors' reports, because much of this loss occurs in the field. The most that can be expected of them is that they bring out the differences which occur from year to year in amount and kind of disease for those areas in which inspections are obtained in relatively larger numbers. Obviously the larger the number of inspections in any given area and the longer the period these are continued, the more valuable the accumulated information.

SUMMARY

This circular presents a study of data furnished by certificates of the food-products inspection service of the Bureau of Agricultural Economics covering 9,543 car lots of strawberries from 11 States examined at terminal markets during the 5-year period ended December 31, 1930.

Inspections covered over 13 per cent of the total carload movement of strawberries for the period. Over 40 per cent of the car lots inspected showed no rot. During the 7-year period ended in 1925, inspections covered about 6 per cent of the cars shipped from these States, and 32 per cent of the cars inspected showed no rot.

The losses from decay during the years 1926 to 1930 show a decided decrease as compared with the previous period in all the States considered.

The decrease appears both in Rhizopus rot and in the brown rots, but it is most marked in Rhizopus rot.

Improved refrigeration and handling methods seem to be foremost among the factors which may account for this difference.

[2] Rose, D. H. Op. cit., p. 4. (See footnote 1.)

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